The gut microbiome — the thriving community of tiny microorganisms that live in our guts — has a key role in aging and longevity, new research suggests.

A pair of new studies find that making a simple change to your diet can hijack the gut microbiome and promote longevity, staving off some of aging's most deadly diseases along the way.

In a study published Monday in the journal Gut, scientists find that a single year of eating a “Mediterranean” diet slowed down the mental and physical signs of aging. Older diet followers also had reduced levels of inflammatory chemicals in their bodies. The analysis included 612 people (and their millions of gut flora, of course).

In the second study, also published Monday, researchers show that eating a plant-based diet over 10 years and avoiding red meat decreased levels of dangerous gut microbes associated with the risk of having a heart attack. This study, which involved 760 middle-aged women, was published in the Journal of the American College of Cardiology.

Together, the studies point to the power of plants to boost healthy gut flora, and keep people sharp, strong, and healthy later in life. Eating more plant-based foods could have significant benefits for your health, the research suggests.

"The interplay of diet, microbiome and host health is a complex phenomenon influenced by several factors," researchers on the first study said in a statement.

"While the results of this study shed light on some of the rules of this three-way interplay, several factors such as age, body mass index, disease status, and initial dietary patterns may play a key role in determining the extent of success of these interactions," they said.
In the first study, researchers investigated whether eating a Mediterranean diet for one year made a measurable difference in the aging process. They asked: Could adding foods like fish, greens, olive oil, and walnuts result in improved physical frailty and cognitive issues in older people?

The study involved 612 elderly people from Poland, the Netherlands, the United Kingdom, France, and Italy. The researchers assigned half the participants to eat a Mediterranean diet, and the other to continue their usual dietary habits for a year. For the former group, that meant consuming mostly vegetables, legumes, fruits, nuts, olive oil, and fish. They reduced their intake of red meat, dairy products, and saturated fats. The second group ate normally, business as usual.

Before and after the diet switch, the research team analyzed what kinds of microbes, bacteria, or flora lived in the participants' guts. They also measured how “frail” these individuals were. Frailty is a natural aging process involving deteriorating bodily functions and increasing inflammation — traits can include weakness, weight loss, and low activity associated with poor health outcomes. Most study participants (433 people) were classified as “non-frail” or generally healthy. But a significant portion (151 people) were on the verge of frailty, while 28 people were classified as frail.

After a year, both the diet and control groups had similar levels of gut-microbiome diversity.

But those who ate the Mediterranean diet had more gut bacteria linked to lower frailty, improved cognitive function, and reduced inflammation. The Mediterranean diet resulted in the same positive gut changes, regardless of the participants' home country.

Specifically, the diet group saw an increase in bacteria that produce beneficial short-chain fatty acids. This good bacteria is linked with improved brain function and memory, as well as walking speed, and handgrip strength. All of these can be taken as measures of quality of life in old age — holding on to these abilities can be vital for their mental and physical well-being, the researchers say.

The diet group also saw a decrease in bacteria involved in producing certain bile acids. Too much bile acid is tied to heightened risk of bowel cancer, insulin resistance, fatty liver, and cell damage.
Higher levels of dietary fiber, and nutrients such as vitamins C, B6, B9, as well as copper, potassium, iron, manganese, and magnesium, may be behind the beneficial bacteria, the researchers say. The Mediterranean diet is rich in these nutrients.

The findings suggest intervening in diet among older people could offer a therapeutic benefit. Poor and restrictive diets are common among older people, particularly those living in long-term residential care, the researchers say. Following a Mediterranean diet, by contrast, could help slow age-related physical and mental decline.

THE HEART CONNECTION

The second study looked at how middle-aged women’s gut microbiome influences heart health. The study involved 760 healthy women between 30 and 55 years old. At two time points, 10 years apart, the group reported their dietary patterns, smoking habits, and physical activity, and gave blood samples.

After 10 years, the researchers also recorded whether these women had had a heart attack or developed coronary heart disease. Of the participants, 380 women had developed heart diseases, while 380 had not.

The team focused in on a microbiota-related metabolite known as trimethylamine N-oxide (TMAO), which is linked to heart disease and poor heart health. TMAO is produced when gut bacteria digest nutrients commonly found in animal products, like red meat.

The researchers compared how the women’s TMAO levels changed over the 10-year period, and in turn, calculated each person’s risk of heart problems.

Women who developed coronary heart disease had higher concentrations of TMAO in both the initial and final blood samples. They also had a higher BMI, a family history of heart attacks, and did not follow a healthy diet (one involving lots of vegetables and few animal products). Women with the biggest jumps in TMAO levels across the 10 years had a 67 percent higher risk of coronary heart disease than average.

This is the first study to investigate the link between coronary heart disease and TMAO levels over the long-term, the researchers say.
"Diet is one of the most important modifiable risk factors to control TMAO levels in the body," Lu Qi, a researcher at Tulane University and the study's senior author, said in a statement.

"Our findings show that decreasing TMAO levels may contribute to reducing the risk of [coronary heart disease], and suggest that gut-microbiomes may be new areas to explore in heart disease prevention."

"The findings of the study provide further evidence for the role of TMAO as a predictive biomarker for heart disease and strengthens the case for TMAO as a potential intervention target in heart disease prevention," Paul Heidenreich, professor at Stanford University, wrote in an accompanying editorial comment.

"The results should encourage us to continue to advocate for a more widespread adoption of healthy eating patterns."

Together the studies suggest taking just one step — eating more plants than animal products — could help protect from the effects of aging, and from heart problems. So perhaps instead of your weekly steak night, try a vegetable curry.